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SCIENCE

VOL. LXII NOVEMBER 13, 1925 No. 1611

CONTENTS

Hodmen of Science: DR. DAVID STARR JORDAN 425
Solar Variation and the Weather: DR. C. G. ABBOT 426
The Kansas City Meeting of the American Association: DR. BURTON E. LIVINGSTON 428
Walter David Hunter: DR. L. O. HOWARD 430
Scientific Events:
The Utilization of Water Areas; Radio Talks from the Harvard College Observatory; Geological Excursion of New York State Colleges; Meeting of the American Society of Mechanical Engineers; Kansas City Meeting of Section Q, Education, of the American Association 430
Scientific Notes and News 432
University and Educational Notes 435
Discussion and Correspondence:
The Florida Man: PROFESSOR F. B. LOOMIS. *Evidence on Basin Range Structure:* PROFESSOR STEPHEN TABER. *Diploid Males from Fertilized Eggs in Hymenoptera:* DR. P. W. WHITING and ANNA R. WHITING. *A Conservationist's Creed as to Wild Life Preservation:* PROFESSOR JOSEPH GRINNELL. *A Whale Shark in the Gulf of Siam:* DR. HUGH M. SMITH 436
Scientific Books:
Planck's Survey of Physics: PROFESSOR WM. S. FRANKLIN 438
Special Articles:
High Voltage Cathode Rays outside the Generating Tube: W. D. COOLIDGE. *The Transfer of Tobacco and Tomato Mosaic Disease:* DR. PETER K. OLITSKY 441
Meeting of the Executive Committee of the American Association for the Advancement of Science: DR. BURTON E. LIVINGSTON 443
Science News x

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HODMEN OF SCIENCE

IT was not often that Huxley, careful of justice and equally so of the value of words, made a false step. But he certainly did so in the reference, in one of his addresses, in which he referred to "species-makers, the hodmen of science." This contemptuous phrase involved in itself certain falsehoods, mistakes in fact, or else failure in understanding. There are no "species-makers." There are describers of forms of life—and, as elsewhere in science, some of them are ignorant, amateurish or careless. Their work may be of no aid to science, and except for the necessary bookkeeping, they have no integral part in it. But poor work is not confined to taxonomy, and Huxley's words could be just as justly applied to workers in morphology.

It was a favorite phrase with Agassiz, "Strive to interpret what really exists." What really exists in the animal and plant world is a prodigious variety of definable forms, which have run the gauntlet of life and which have endured. These groups, called species, are varied within themselves and differ in highly varying degrees from other similar groups, the boundaries of species being well defined or ill defined, usually in proportion to the barriers that surround or separate them. That which concerns us as naturalists is the truth, whatever it may be, and the expression of the individual facts in tangible and recordable form.

In these matters, exactness of records is as vital as good maps are to geography, and in biology, as in geography, early work is inferior to late work, and inaccuracy is likely to intrude anywhere. In zoology and botany it is equally important to know the usual or normal form, and as far as may be, the variants or connectives which may spring from it.

Two very important branches of science are absolutely dependent on broad and accurate knowledge of species as they exist in nature, and these can not be separated far from each other. These are geographical distribution, on the one hand, and organic evolution, on the other. The relation of the first is evident; that of the other is not less vital. The major problem of organic evolution is summed up in the "Origin of Species." We assume, and must assume, that every feature of life, as we know it, has behind it some sufficient cause. The grouping and generalization of these multitudes of elements constitutes our answer to this problem of the "Origin of Species." All serious students agree as to the

cumulative evidence as to the *orderly change*, our knowledge of which as applied to animals and plants constitutes organic evolution.

But here agreement ends. Observers, experimenters and philosophers have each different points of view. Observers in the field, assuming the facts of heredity and variation, the former inherent in the chromosomes, the latter in large degree at least promoted by double parentage and unequal division of chromosomes in maturation of germ-cells, find natural selection a universal factor in life adaptations; moreover, that barrier-isolation with its consequent segregation and preservation from mass-breeding is an efficient cause of the moulding of species as they are. That species, as they exist in nature, are *real "species,"* not products of species-makers, whether "lumpers or splitters" (two slang names for incompetents) must be admitted.

That forms equally distinct to all appearance may be developed in a short time, in the breeding-pen or greenhouse, may be admitted. These are produced in the same way—by a chosen variation being placed under a new and non-competitive environment, the basis of selection being wholly changed, and the product carefully segregated. It does not compete with the mass, nor can it interbreed with it. These imitation species, or "creations," to use the florist's term, have not entered the gauntlet of life. They have not endured and mostly would not endure. In the open they would be swamped by mass breeding, by lack of prepotence—or in most cases by lack of competitive vitality.

It is probable that every species in nature is purged by natural selection and retained through segregation. Every one we know has, more or less clearly, a relation to geographic (or in rare cases to physiological) barriers. Most closely related species will interbreed (plants especially so) when opportunity favors. Yet hybrid individuals are relatively few, a few dozens recorded among birds and fishes, while not a single species known can be reasonably supported to have arisen from hybridism.

Most experiments on "species" have been made along the selection of unusual examples or with hybridization of existing species. It is natural that one who has not realized the cumulative evidence, which shows the relation of distinctness of species to geographic isolation ("räumliche Sonderung"), should, in contemplation of "mutation" and "Mendelism" as species-formers, be "agnostic" regarding the whole matter of causes of evolution. For hybridism or mutation are rarely or never the basis of a species in nature. The experiments of de Vries with a garden flower, presumably a hybrid, are not typical of the ways of "wild nature." Several writers, especially on botany, calmly ascribe the division of genera into species to "mutation." We have yet to hear of any single species which could be, with any probability, regarded as having arisen by "mutation" or by "Mendelian hybridism." The experimenters can not afford to ignore the students of "things as they are," and who "strive to interpret what really exists," the men whom Huxley termed "hodmen of science."

The conception of Darwin that the accumulation of favorable variations may of itself and without segregation produce new species within the territory of the parent stock is as yet unproved and seems improbable. We must note two general facts. First, the features which distinguish species or subspecies are not as a rule matters of survival importance. Selection will, as a rule, speedily eliminate injurious qualities. But one existing species is (under like stress) just as well adapted as another.

Second, closely related species never occur within the same limits (a few cases attributed to reinvasion excepted). Nor are they as a rule widely separated, being on different sides of some barrier, mountain, sea, desert or other feature, not wholly insurmountable but rarely crossed. This feature of "island life" and "mountain life" is well known to all actual students of geographical distribution.

The philosophers of evolution must depend on observers and experimenters. In one sense their conclusions are negligible, for these are temporary and variable. A theory or working hypothesis becomes a part of science when its rival hypotheses have ceased to work. Organic evolution by this means has become a part of science. The extension of our knowledge of the factors that lie behind it has now become, in a sense, more important than the theory itself.

As to these causal factors, it may be noted that the broader the view the less the accuracy in detail. The "hodmen of science" may console themselves with the words of Linnaeus, "The tyro makes classes, the master makes species"; or better with Darwin's warning that "no one should discuss species at all who has not minutely compared and described many of them."

DAVID STARR JORDAN

STANFORD UNIVERSITY

SOLAR VARIATION AND THE WEATHER

I AM strongly interested in the papers of Professors Marvin and Kimball which recently appeared in the *Monthly Weather Review* for July. Being about to

go upon an expedition to select sites and arrange a solar radiation observing station in the eastern hemisphere, under the joint auspices of the National Geographic Society and the Smithsonian Institution, I am compelled to forego any extensive study and rejoinder. Yet I would be sorry if a silence of seven months should convince scientific men that no rebuttal on our part is possible and that the insignificance of solar variation as an agent affecting weather must be conceded. Therefore, I venture to note a few points which my hasty examination of the papers thus far suggests.

(1) I by no means agree with Professor Marvin that "it is futile to hope to establish any scientific basis for weather forecasting on supposed changes of solar constant before we know that the constant does change from day to day, and if it does, how much." For while neither Professor Marvin nor certain other authorities are yet ready to admit that our observations have demonstrated either the real variability of the sun or its magnitude, the adoption of solar variability as a working hypothesis has already yielded in the hands of Clayton, Arctowski, Nansen, Walker and others meteorological correlations which are now actually being used with a moderate measure of success in the official long-range forecasting of Argentina and in the private long-range forecasting of Clayton. Progress in this line is to be expected quite as much as in others.

(2) Professor Marvin compares, on page 292 of his article, the scatter of three groups of data: (a) direct pyrheliometer readings; (b) approximate solar constants, which he computes by a method of his own and calls "hybrid solar constants"; (c) our solar constants obtained after the method of Langley. He expresses perplexity because the scatter of (a) exceeds that of (b), and this again exceeds that of (c), and intimates that this line must be pursued further with more data in search of an explanation for this paradox. Surely it would have been astonishing if it had been otherwise. The data (a) are affected by every change of atmospheric transparency and humidity. In Professor Marvin's "hybrid solar constants" these atmospheric sources of fluctuations are partially eliminated. In the Langley method, which gives what I may in contradistinction call "thoroughbred solar constants," these atmospheric sources of fluctuation are approximately completely eliminated. No wonder the scatter becomes smaller!

Indeed at this point I can not but express my surprise that Professor Marvin sees such a hopeful solar variation prospect in pyrheliometer measurements alone, unaccompanied by measurements adapted to accurately evaluate and remove atmospheric sources of fluctuation. If one were observing on the moon, the pyrheliometer alone would be a useful instrument to detect solar changes, but not here.

(3) Both Professor Marvin and Professor Kimball admit some possibility that our results have discovered (a) solar variations of considerable duration for which they use the term "secular," and (b) occasional briefer changes accompanying the passage of sunspots across the center of the solar disk. These possibilities Professor Marvin reserves to discuss later. He expressly states that his present paper (although filling eighteen quarto pages) is designed merely to discuss the possible reality of day-to-day solar changes. Nevertheless, he devotes three pages to disclosing, as he believes, a yearly period in the Mount Wilson and Chile observations accompanied by higher values in midsummer. Since the opposite, as he finds, occurs at Harqua Hala, he obligingly accuses us of fudging the Harqua Hala results by statistically determined corrections, in such a manner as to force them to agree with Montezuma. I shall reserve discussion and reply to a more extensive publication.

It is of interest here to point out that on the showing of his own curve the yearly effect he points out on Mount Wilson should have produced but four tenths per cent. range during all the months observed, namely, May to November. Of these, May and November seldom appear. Marvin's range, June to October, is but one fourth per cent.

In Mr. Clayton's studies of these old data, which Professor Marvin seeks to cast into disrepute by the hypothesis of a yearly periodic fluctuation, Clayton in part compares the weather conditions of identically named months of different years, *i.e.,* July with July, et cetera. One hardly sees how even Marvin finds room to criticize that. In the other part of his discussion, Clayton groups the results into high, medium and low values, using all the data of four years. His range from high to low is 5 per cent. or over twelve times the applicable part of Marvin's supposed annual correction.

Out of this latter work of Clayton's comes the extraordinary diagram connecting solar variation with the temperature of Buenos Aires for twenty days after, which I first published in 1920 and again as Figure 1 of Smithsonian Miscellaneous Collections No. 2825. I have repeatedly challenged Professor Marvin and Kimball, both privately and publicly, to explain this result and say why it is not a starting point for a new departure in forecasting. So far they have made no response of any kind. However, Mr. Clayton and Mr. Hoxmark, as shown in Smithsonian Miscellaneous Collections Nos. 2826 and 2827, have

reduced the method to practice with results which, while not ideal, already show sufficient prevision to be worth money to men of affairs. One wishes that financial means were available to push Mr. Clayton's line of investigations, which seems to promise much.

(4) Professor Marvin clothes his statistical methods with powers which I am far from conceding. Having shown by his diagram (Figure 6) that the "probable" variation or measure of average scatter of the solar constant in the year 1919 does not exceed 0.6 per cent., he proposes to determine whether that part of it due to real solar changes may not be shown to be still less. Discrimination depends on the consideration that the relative scatter of pyrheliometer values at different air-masses is differently affected by solar and atmospheric causes.

It is well recognized: (a) On many of the best days, changes of transparency materially affect the comparability of pyrheliometer values. (b) This source of error is eliminated in our "short method," so that we observed with good results on many days when the "long method" was inapplicable. (c) Hence, many of the days used by Professor Marvin which were only fit for short methods are not to be regarded even as "best days." (d) Atmospheric dustiness and humidity alter greatly during a year and produce entirely different kinds of effects on different spectral rays. (e) On these and other accounts, Bouguer's formula is inapplicable to pyrheliometry in general and more particularly to some of that used by Marvin. (f) The basic assumption of Professor Marvin (p. 290, lines 30 to 33) nevertheless depends on the applicability of Bouguer's formula thereto. How wrong it is may be seen by comparing, for example, January 6 and January 19, 1919. They show a difference at air-mass unity of 12 per cent. and only 21 per cent. at air-mass four. According to Marvin's assumption, these numbers should be as 1 to 4. (g) Formulae relating to the precision of measurements depend on treating errors as differentials. How can one justify treating quantities like 12 or 21 per cent., or even the halves of them, as differentials?

Notwithstanding these weaknesses and others, Professor Marvin would have us believe that his statistical discussions of pages 290 to 293 have eliminated atmospheric effects from fluctuations ranging 10 to 20 per cent. so thoroughly as to warrant derogatory inferences as to the reality of a solar variation whose average is known to be not exceeding the order of 0.6 per cent. during the period considered. Statistical methods are useful, but they can not work miracles. If one starts with figures he must end with figures of some sort, but their significance may be zero.

(5) Professor Kimball, after tricking the eye with circles, admits apparent day-to-day correlations between Montezuma and Harqua Hala, but regards them as so small as to be meaningless, and like Professor Marvin attributes them to irresponsible fudging of Harqua Hala results. He eliminates the important big correlation of a secular character in 1922 by his grouping. If it be admitted as real, it, at least, might seem of interest.

(6) No one is more conscious than myself that the solar constant data are still imperfect. We are working with all our little force, not only to make new and better determinations, but to rectify as far as possible those published in preliminary fashion hitherto. Old values, as I have elsewhere remarked, are poor, newer ones better, and future ones we hope will be better still. Successive improvements show on Professor Marvin's diagrams. I do not believe, however, as he does, that the total elimination, if it were possible, of the present existing errors will remove the day-to-day variations of Montezuma results to a considerable extent. We are dissatisfied with summer conditions at Harqua Hala, and have just removed to a new station on Table Mountain, California, 2,000 feet higher, and with much better sky conditions. We are making great improvements in procedure at both stations. These should speak for themselves. In the meantime, I can not but wonder whether if Professor Marvin had used as much pains to search for useful correlations between our published values and weather conditions as he has used to discredit our results of 1905 to 1920, we might not have been further along.

C. G. ABBOT,
Assistant Secretary
SMITHSONIAN INSTITUTION

THE KANSAS CITY MEETING OF THE AMERICAN ASSOCIATION

ARRANGEMENTS for the approaching Kansas City meeting (December 28 to January 2 next) are well advanced. It will be a great success.

The usual reduced railway rates have been secured from the regional passenger associations. The certificate plan will again apply for the United States and for eastern Canada. Persons going to the meeting, whether members of the association or not, should purchase one-way tickets, securing a certificate for the American Association for the Advancement of Science and Associated Societies. (A receipt is not what is needed.) After validation at the meeting the certificate will entitle the bearer to purchase a return ticket at half the regular fare.

The Hotel Muehlebach (12th St. and Baltimore Ave.) is to be the general headquarters for the meet-

A LIST OF KANSAS CITY HOTELS

Name of Hotel	Address	Number of Rooms	Prices, without Bath		Prices, with Bath	
			Single	Double	Single	Double
altimore	12th & Baltimore Ave	500	$2.50 to $3.50	$4.00 to $5.00	$3.00 to $12.00	$5.00 to $15.00
ray	1114 Baltimore	100	1.50 to 2.00	2.50 to 3.00	2.00 to 3.00	3.00 to 5.00
entral	12th & Central	100	1.50	2.50	2.00 to 2.50	3.00 to 3.50
oates House	10th & Broadway	250	1.25 to 3.00	2.00 to 4.00	2.50 to 5.00	4.00 to 7.00
ordova	515 West 12th	100	1.50 to 2.00	2.00 to 2.50	2.00 to 3.00	3.00 to 4.50
ensmore	912 Locust	200	1.00 to 1.50	2.00 to 2.50	2.00 to 3.00	3.00 to 4.00
ixon	12th & Baltimore Ave.	250	1.50 to 2.00	2.50 to 3.00	2.50 to 3.00	4.00 to 5.00
lennon	106 West 12th	100	2.00	3.50 to 4.00	2.50 to 4.00	4.00 to 6.00
C. A. C. (No Ladies)	11th & Baltimore	350	All Rooms with Bath		3.50 to 5.00	4.50 to 7.50
eystone	12th & Broadway	100	1.25 to 1.50	1.75 to 2.00	2.00 to 2.50	3.00 to 3.50
upper	11th & McGee	200	1.50 to 3.00	3.00 to 4.00	3.00 to 5.00	4.00 to 8.00
cerne	Linwood & Harrison	100	All Rooms with Bath		2.50 to 3.00	3.00 to 5.50
ercer	12th & McGee	100	1.50 to 2.50	2.50 to 3.50	2.50 to 5.00	3.50 to 6.00
uehlebach	12th & Baltimore Ave.	500	3.00 to 3.50	4.50 to 5.00	3.50 to 9.00	5.00 to 12.00
ew Oxford	1222 Locust	100	1.25	2.00	1.50 to 1.75	2.25 to 2.50
sbach	12th & Wyandotte	100	1.50 to 3.00	2.50 to 4.00	2.00 to 4.00	3.00 to 6.00
voy	9th & Central	250	1.50 to 2.50	2.50 to 3.50	2.00 to 4.00	3.00 to 6.00
xton	15 West 12th	150	1.50 to 2.50	2.50 to 3.50	2.50 to 4.00	4.00 to 6.00
yderhof	917 Oak	150	All Rooms with Bath		2.50 to 3.50	3.50 to 5.00
ats	12th & Wyandotte	250	All Rooms with Bath		2.00 to 3.50	3.50 to 7.50
nner	917 Locust	100	1.25 to 1.50	2.00 to 2.50	1.50 to 2.00	3.00 to 4.00
ashington	1201 Washington	100	1.50 to 2.00	2.00 to 3.00	2.00 to 3.00	3.00 to 5.00
estgate	9th & Main	250	All Rooms with Bath		1.50 to 3.50	3.00 to 5.00

ing. Numerous other hotels are to be available and some of the societies meeting with the association at Kansas City will have other headquarters. A list of Kansas City hotels follows, with prices.

Those who plan to attend the meeting should arrange for rooms as soon as possible, addressing the hotel managements.

The lists of members of the local committee for this meeting and the local representatives of the several sections have been published in SCIENCE for July 17, 1925.

The preliminary announcement of the meeting will this year be published in SCIENCE for November 27, instead of as a separate pamphlet. It will be sent to all members.

Those who are to present papers or addresses at the Kansas City meeting are asked to prepare two copies of their papers for the publicity service. One copy is to be sent to Science Service, Washington, D. C., and the other is to be sent to Mr. Lyle Stephenson, care of Mr. W. M. Symon, Chamber of Commerce, Kansas City, Mo. It is also asked that each copy be accompanied by an abstract or summary of the paper, worded as far as possible so that it may be useful to the daily press without rewriting. It needs to be emphasized that the press wishes to report, as well as may be, just what is said rather than an outline of the subject discussed. In recent years many members have sent in such outlines instead of abstracts of their remarks, with the result that much valuable material failed to receive proper publicity. It should be noted that, although the full paper and its abstract ought to be in the hands of the publicity editors weeks before the meeting, yet nothing will be given out till the day on which the paper or address is actually to be presented. *For the good of our association and of American science, authors of papers and addresses are asked and urged to send their material in early, just as soon as possible, and to send like copies to both Washington and Kansas City.* This applies to all who are to take part in the programs of the meeting, whether they are members of the association or not.

As the society and section programs come to the permanent secretary, each person whose name occurs in any program will receive a request asking for the manuscripts mentioned above, together with blue sheets for the abstracts. But it is specially asked that manuscripts and abstracts be prepared and sent to Washington and Kansas City just as soon as that can be done, without awaiting the special request. The program manuscripts from the secretaries are often necessarily very late in arriving at the Washington office and the special requests are consequently often greatly delayed in such cases.

B. E. LIVINGSTON,
Permanent Secretary

WALTER DAVID HUNTER

ON October 13 Dr. W. D. Hunter, chief of the section of insects affecting southern field crops of the Bureau of Entomology of the U. S. Department of Agriculture and a member of the U. S. Federal Horticultural Board, died suddenly at El Paso, Texas, in his fiftieth year. He was buried on October 16 at Houston, Texas, where he had been stationed for some years, leading the successful fight to exterminate the pink bollworm of cotton in the United States. Dr. Hunter was graduated at the University of Nebraska with the degree of A.B. in 1895 (A.M. in 1897), and in 1916 was given the degree of LL.D. by Tulane University, of Louisiana. After graduation he was an assistant in entomology at the University of Nebraska, and in 1901 was assistant entomologist in the Iowa Agricultural Experiment Station. In 1902 he came to the U. S. Department of Agriculture and was made assistant entomologist in charge of boll weevil investigations, and in 1905 was placed in charge of all southern field crop insect investigations. In 1908 he was made a member of the Federal Horticultural Board. Since the advent of the pink bollworm in Texas he has been stationed at Houston, Texas, in active charge of the eradication work directed against this insect. Dr. Hunter was a fellow of the American Association for the Advancement of Science, member of the American Ornithologists' Union, the Entomological Society of Washington and the American Association of Economic Entomologists. He was president of the last-named organization in 1913. He was the author of numerous papers and reports, all of a very high character.

Dr. Hunter was one of the strongest men in the Department of Agriculture. He gained a grasp, not only of the boll weevil situation, but of the whole cotton-growing industry, of an almost unequaled character. He commanded the respect and confidence of the best men in the south. He was one of the advisory board of the Bureau of Entomology, and the work which he and his assistants have done on the cotton insect problem, particularly on the cotton boll weevil and the pink bollworm, has been of the very highest rank, both from the scientific and the practical point of view.

Although Dr. Hunter's main work was devoted to the solution of cotton insect problems, he became greatly interested a dozen years ago in the carriage of disease by insects. His admirable presidential address before the American Association of Economic Entomologists was entitled "American interest in medical entomology," and at about the same time he was charged with the direction of the Bureau of Entomology project entitled "Insects affecting the health of man and animals," on which Mr. F. C. Bishopp, Captain D. L. Van Dine and Dr. W. V. King have done such remarkable work under his supervision.

Probably Dr. Hunter will always be best remembered as the man who had virtual charge of the cotton boll weevil investigations of the department for more than twenty critical years; but surely his work in the eradication of the pink bollworm in Louisiana and Texas, both as an entomologist and as a member of the Federal Horticultural Board resident in Texas, with the immense practical difficulties involved, necessitating clear judgment, infinite tact and ability to influence men of affairs, will always be remembered by those who understood the seriousness of the situation and who are familiar with its countless difficulties.

He was a sound entomologist. He was a broad, far-sighted man of affairs. He was an administrator who commanded the respect and affection of those associated with him. His death is a very great loss to the Department of Agriculture and to the country as a whole.

L. O. HOWARD

BUREAU OF ENTOMOLOGY,
U. S. DEPARTMENT OF AGRICULTURE

SCIENTIFIC EVENTS

THE UTILIZATION OF WATER AREAS

A RECENTLY formed committee of the division of biology and agriculture of the National Research Council is instructed to consider the possibilities of increased utilization of interior waters for production of food and other necessaries and especially to indicate what may be the need and the possibilities of scientific investigation to promote such an end. The committee will consider the general subject of aquiculture and also its probable relations to conservation of waters in streams, lakes and soils, and thus to agriculture, forestry and the general welfare.

It is the intent of the committee: (1) to secure information regarding the status of aquiculture in certain other countries and the nature of the research work that is directed at the problems of aquiculture in those countries; (2) to learn what facilities and personnel in this country are available for research relating rather directly to this subject; (3) to inquire if, among institutions and persons engaged in such studies, it is desirable or practicable to promote a greater degree of cooperation or coordination of work than now prevails, and (4) to ascertain if additional facilities or means may be desirable and obtainable.

Fundamental to all this is the necessity of offering, if practicable, a general statement of the kinds of research work that should be pursued in order to establish the foundation of scientific data requisite for the development of practical methods of preserving

and increasing the productivity of waters. This aspect of the committee's task is to be viewed in a broad way. Undoubtedly it is desirable that there should be experimental work of a relatively direct nature, but strictly scientific in method, in reference to such matters as the nutrition of fishes and selective breeding. It is also probable that no less important in the long run will be physiological physico-chemical and other studies not utilitarian in viewpoint but still having to do with problems underlying the *biological productivity* of bodies of water.

The committee fully realizes that the successful accomplishment of its task is conditioned upon the assistance of all who have an interest in the matter. It can report fully and wisely only if it has advice, suggestions, criticism and especially information from institutions and persons having a direct or indirect concern in the kinds of work that come within its purview.

This statement is intended to invite the submission of advice and information. Communications may be addressed to the Division of Biology and Agriculture, National Research Council, Washington, D. C., or to Professor R. E. Coker (Box 950, Chapel Hill, N. C.), who has been requested by Professor Metcalf to serve as acting chairman of the committee, pending his return from foreign travel.

The Committee:

MAYNARD M. METCALF,
Johns Hopkins, Chairman;
R. A. HARPER,
Columbia University;
STEPHEN A. FORBES,
Illinois Natural History Survey;
CHANCEY JUDAY,
Wisconsin Geological and Natural History Survey;
E. N. TRANSEAU,
Ohio State University;
S. W. BEYER,
Iowa State College;
R. E. COKER,
Acting Chairman, University of North Carolina, Chairman, Division of Biology and Agriculture, ex officio

RADIO TALKS FROM THE HARVARD COLLEGE OBSERVATORY

DR. HARLOW SHAPLEY, director of the Harvard College Observatory and professor of astronomy at Harvard University, gave on November 2 the first of a series of twenty-two radio talks on astronomy to be given by members of the Harvard Observatory on Tuesdays and Thursdays and broadcast by station WEEI. Dr. Shapley's subject was "What are the stars?"

The other talks have been scheduled as follows:

November 5—*Bright stars and constellations,* DR. WILLIAM LUYTEN.
" 10—*Telescopes and their uses,* PROFESSOR WILLARD P. GERRISH.
" 12—*Photographing stars and planets,* PROFESSOR EDWARD S. KING.
" 17—*Great American observatories,* LEON CAMPBELL.
" 19—*The origin of the earth and other planets,* DR. SHAPLEY.
" 24—*Eclipses of sun, moon and stars,* MR. CAMPBELL.
" 26—*Comets,* PROFESSOR KING.
December 1—*Shooting stars,* DR. WILLARD J. FISHER.
" 3—*The age of the earth,* DR. SHAPLEY.
" 8—*The stuff stars are made of,* DR. CECILIA H. PAYNE.
" 10—*Classifying the stars,* DR. ANNIE J. CANNON.
" 15—*Stellar evolution,* DR. PAYNE.
" 17—*The number and sizes of the stars,* DR. LUYTEN.
" 22—*Star clusters and nebulae,* PROFESSOR SOLON I. BAILEY.
" 29—*The Milky Way,* PROFESSOR BAILEY.
" 31—*Measuring the universe,* DR. SHAPLEY.
January 5—*Beyond the Milky Way,* DR. LUYTEN.
" 7—*The amateur's work in astronomy,* MR. CAMPBELL.
" 12—*New stars and variables,* DR. CANNON.
" 14—*Relativity,* PROFESSOR KING.
" 19—*Life in other worlds,* DR. SHAPLEY.

GEOLOGICAL EXCURSION OF NEW YORK STATE COLLEGES

THE first intercollegiate geological field meeting of New York state colleges was held at Clinton and Little Falls, N. Y., on May 15 and 16 last. The various delegations of teachers and students met at Clinton during the forenoon of Friday, May 15, and were guests at luncheon of Hamilton College. The afternoon was spent in a visit to the iron mines in the Clinton formation and in examining the Silurian section in the neighborhood. A dinner was held in the evening at the house of the country club near Utica. President F. C. Ferry, of Hamilton College, made a brief address of welcome, and Profesor A. P. Brigham, of Colgate University, delivered a lecture on the geography and historical significance of the Mohawk gorge at Little Falls. Dr. N. C. Dale, of Hamilton College, spoke briefly about Paleozoic rocks and Dr. H. L. Alling, of the University of Rochester, discussed Adirondack pre-Cambrian problems.

On Saturday the party journeyed to Little Falls where the day was spent. The structural features studied were the various pre-Cambrian intrusives, the great unconformity, the fault bounding the gorge on

the east and the glacial pot-holes. The Beekmantown and associated Ordovician formations were accessible here. Dr. Dale acted as field director during both days.

Participating institutions were: Buffalo, Colgate, Cornell, Hamilton, Rensselaer Polytechnic Institute, Rochester, St. Lawrence, Syracuse, Union, Vassar and the New York State Museum. Syracuse was chosen as the site for the gathering in 1926, and the general feeling expressed was that the benefit of mutual contact between geological students in such field excursions is sufficient to warrant making them annual or semi-annual events.

The thanks of those in attendance are especially due to Dr. Dale and Hamilton College for their entertainment, and to Dr. R. Ruedemann for furnishing valuable lists of fossils.

HARRY N. EATON,
Secretary

SYRACUSE UNIVERSITY

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

THE next annual meeting of the American Society of Mechanical Engineers will be held in New York City from November 30 to December 4. According to the tentative program, Monday, the first day, will be devoted to meetings of delegates and council meetings. The following three days will be devoted to technical sessions for the presentation of papers. It is planned to hold simultaneous section meetings on various topics. The subjects for Tuesday morning will be oil and gas power, machine shop practice and a session on wood industries. In the afternoon the subjects of the sessions will be industrial power, railroads, centrifugal compressors and calculation methods, and in the evening, industrial furnaces, materials handling, machine shop practice and springs.

Wednesday afternoon will be devoted to the presentation of the annual report, the awarding of prizes and progress reports of committees, and there will also be addresses on education and training for the industries, and several conferences. The annual dinner will be held in the evening.

On Thursday morning there are planned other technical sessions on the subjects of steam power, management, aeronautics and textiles. In the afternoon the sessions will be devoted to power plant materials, industrial psychology, lubrication and design, while the evening will be devoted to a symposium on national defense. The last day, Friday, will be occupied with council and committee meetings and to excursions.

Other features of the meeting will be the Henry Robinson Towne lecture on "Engineering and economics" on Tuesday at 4:30 by the Honorable Herbert Hoover, and the Robert Henry Thurston lecture on "Engineering and science," by Dr. Zay Jeffries, on Thursday at 4:30. Honorary memberships will be awarded to Mr. Hoover and to Worcester R. Warner, past president of the society, on Tuesday evening, followed by the presidential address and reception.

KANSAS CITY MEETING OF SECTION Q, EDUCATION, OF THE AMERICAN ASSOCIATION

THE general plan for the meetings of the section at Kansas City are as follows:

Tuesday morning, December 29. Specific Studies of School Curricula. This program to be composed of five or six special papers, reporting work in different parts of the country.

Tuesday afternoon, December 29. Specific Studies of Teaching Procedure. This program is composed of five or six special reports of investigations in class-room procedure.

Wednesday, December 30, both morning and afternoon, given to reading and discussion of shorter papers volunteered for the program by workers in universities, teachers colleges and public schools.

Wednesday evening, December 30. Joint dinner of members of Section Q and the educational fraternity Phi Delta Kappa. The organization of the dinner is in the hands of Phi Delta Kappa. The address of the vice-president of Section Q, L. A. Pechstein, is to be given at this dinner.

Thursday, December 31, both morning and afternoon. Joint sessions with the Section of Psychology. The morning program is to deal with the refinements of instruments of measure in education; the afternoon with reports concerning psychological and educational clinics.

Persons who have been engaged in work dealing with the topics of the program are invited to communicate at once with the officers of the section.

OTIS W. CALDWELL,
Teachers College, Columbia University,
Vice-president, Section Q
A. S. BARR,
Department of Education, University of Wisconsin, *Secretary*

SCIENTIFIC NOTES AND NEWS

IT is planned to celebrate the fiftieth anniversary of the doctorate of Professor H. A. Lorentz, of the University of Leyden, by establishing a Lorentz fund, for the advancement of theoretical physics. An executive committee consisting of Professor Onnes, Professor Zeeman and Dr. Fokker has been formed to raise the funds.

THE Russian Association of Scientific Workers, in connection with the bicentenary of the Academy of Sciences, is organizing a series of public fêtes in honor of science veterans. The list of those to be thus honored by the people includes: Professor Bekhterev, Professor Pavlov, Professor Karpinsky, the president of the academy, who is completing half a century of scientific work, the botanist Borodin, who is completing sixty years of scientific work, the nonagenarian Orlov, the librarian of the academy, who, in spite of his great age, is still at his post, and several others.

SEVEN surgeons, including five from overseas, received honorary fellowships in the American College of Surgeons at the closing session of the Philadelphia meeting. Those honored were Lord Dawson of Penn, physician to the King of England; Sir William Arbuthnot Lane, London; Professor Vittorio Putti, Bologna, Italy; Dr. William Blair Bell, Liverpool; Dr. Philip Franklin, London; Dr. William H. Carmalt, New Haven, Conn., and Dr. Frederic S. Dennis, New York City. The fellowships were conferred by Dr. Rudolph Matas, president of the congress.

ON the occasion of the meeting of the American College of Surgeons the honorary degree of doctor of science was conferred by the University of Pennsylvania on Lord Bertram Dawson, of Penn, physician to the King of England and the Prince of Wales; Dr. Charles H. Mayo, Rochester, Minn., and Dr. Rudolph Matas, New Orleans. The university held a special ceremony in Houston Hall, where Provost Josiah H. Penniman conferred the degrees.

DR. F. O. BOWER, who recently retired from the Regius professorship of botany in the University of Glasgow, is spending two months in filling lecture engagements in the United States. Dr. Bower was the guest of honor at a dinner in New York given by Dr. N. L. Britton and Professor Robert A. Harper, on the evening of October 5. Forty-eight botanists were present. After dinner addresses were made by Dr. Britton, Professor Bower, Professor Harper, Dr. William Crocker, Professor John M. Coulter and Dr. W. J. V. Osterhout.

DR. PIERRE JANET, Paris, France, was the guest of the Neurological Section of the New York Academy of Medicine and the New York Neurological Society at a tea given in his honor at the academy on October 23.

DR. J. WALTER FEWKES, chief of the Bureau of American Ethnology, was elected an honorary member of the El Paso Archeological Society at the October meeting of the society.

DR. ALEŠ HRDLIČKA has been elected a fellow of the National Academy of Sciences of Czechoslovakia. He has also been made an honorary member of the Oxford University Anthropological Society.

SIR FREDERIC L. NATHAN has been elected president of the Institution of Chemical Engineers, England.

DR. CARL LARSEN, St. Paul, was elected president-elect of the Inter-state Postgraduate Assembly at the annual convention in St. Paul, Minn., on October 16. Drs. William J. Mayo and Charles H. Mayo, Rochester, remain as presidents of clinics, and Dr. William B. Peck, Freeport, Ill., as managing director of the assembly, which hereafter will be known as the Inter-state Postgraduate Association of North America instead of the Inter-state Postgraduate Assembly of America.

AT the annual meeting of the Federation of Bird Clubs of New England, held on November 6 at the State House, Dr. T. Gilbert Pearson was elected *president,* Dr. Alfred O. Gross, of Brunswick, Me., *vice-president;* Laurence B. Fletcher, of Brookline, *secretary,* and Charles B. Floyd, of Auburndale, *treasurer.* President Pearson succeeds Edward H. Forbush, the state ornithologist, who was elected to a position on the board of councilors.

DR. ARTHUR BRAMLEY has been appointed Bartol Fellow of the Bartol Research Foundation of the Franklin Institute and has taken up his work. The laboratories of the foundation have been equipped with all primary essentials for investigations in modern physics, particularly those pertaining to fundamental problems in electricity. From time to time the foundation will appoint fellows who will pursue investigations in its laboratories. Applications for fellowships should be made to the chairman of the Personnel Committee, 127 North Nineteenth Street, Philadelphia, from whom further particulars may be obtained.

PROFESSOR S. S. STEINBERG, of the University of Maryland, has been appointed assistant director of the highway research board of the National Research Council. He will also for the present continue to serve as acting secretary of the investigation on the development of earth roads now being conducted under the auspices of the board. Professor Steinberg served as assistant director during the summer of 1924. H. F. Janda, formerly assistant director, has been designated secretary to research committees in accordance with the new policy of the board to employ technical assistants who shall devote full time to research committee work. Professor Janda will return to his duties at the University of North Carolina on January 1, 1926, at the expiration of his leave of absence.

E. CHAPMAN, of the College of Engineering at Purdue University, has been appointed research engineer for the Lincoln Electric Company, Cleveland.

CAPTAIN R. B. SEYMOUR SEWELL has been appointed director of the Zoological Survey of India. Dr. Sewell was educated at Christ's College, Cambridge, and is well known for his zoological writings in connection with Indian zoology.

DR. ROY CHAPMAN ANDREWS, leader of the third Asiatic expedition of the American Museum of Natural History to Mongolia, has returned to New York with a large collection of fossils and archeological material.

PAUL C. STANDLEY, of the U. S. National Museum, sailed on November 6 for Panama, where he will spend a few weeks gathering additional material for a flora of the Canal Zone, which is now nearly ready for publication. He will pass most of the winter in Costa Rica, continuing the field work of previous years, which has for its object the preparation of a descriptive flora of Central America.

EMERY C. LEONARD, of the U. S. National Museum, sailed from New York on November 6 for Haiti, where he will spend several months in botanical exploration.

GEORGE A. SOPER, managing director of the American Society for the Control of Cancer, has returned to New York after a three months' investigation of the problem of cancer control in Europe.

HENRI VERNE, French art critic and an authority on French art museums, has been appointed director of the French State Museums, replacing Destournelles de Constant, who has been pensioned.

A GROUP of distinguished French medical men are visiting South America. Drs. Marchoux, of the Pasteur Institute; L. Bernard, Babinski, Vaquez, of the Paris Medical School, and G. Dumas, of the Sorbonne, recently lectured at the academy and the medical school at Rio de Janeiro. Professors L. Bernard, Babinski and Vaquez were made honorary members of the academy. After their Rio visit, the French physicians proceeded to São Paulo and thence to Montevideo and Buenos Aires.

MERRITT L. FERNALD, Fisher professor of natural history at Harvard University, spent the summer studying the region in Newfoundland. On November 4 he gave at the Harvard Club of Boston an illustrated lecture on the unmapped regions of Newfoundland.

DR. COLIN G. FINK, of Columbia University, addressed a group of chemists and engineers of Chicago on "The electrolytic restoration of ancient bronzes" on the evening of October 23. A series of photographs were shown illustrating the transformation that takes place.

LIEUTENANT COMMANDER MARION EPPLEY, founder of the Eppley Scientific Laboratory, at Newport, R. I., lectured before the Franklin Institute on November 5, on "Standard electrical cells."

WILLIAM BEEBE, head of the New York Zoological Society's recent expedition to the Galapagos Islands and the Saragossa Sea, will describe that voyage in a lecture on "The Arcturus adventure," illustrated with still and motion pictures, on the evening of November 18, in Brooklyn, under the auspices of the Brooklyn Institute of Arts and Sciences.

DR. JAMES F. NORRIS, professor of chemistry at the Massachusetts Institute of Technology and president of the American Chemical Society, was the speaker at the 205th meeting of the northeastern section of the society, being held at the Massachusetts Institute of Technology, on November 13. Professor Norris speaks at 8 P. M. on "Chemical reactivity." Preceding the meeting there was a reception to President Norris at 6 P. M. in the Walker Memorial Building and an informal dinner followed at 6.30.

THE lectures to be given at the Massachusetts Institute of Technology by Professor Max Born, of the University of Göttingen, Germany, will be given in two series: The first from November 16 to December 24, 1925, and the second from January 3 to January 23, 1926, on the subjects of "The lattice theory of rigid bodies," on Mondays at 4 P. M., and "The structure of the atom," on Wednesdays and Fridays at 4 P. M.

THE Bradshaw Lecture on "Gastrojejunostomy," of the College of Physicians and Surgeons, England, was delivered by Mr. James Sherren on November 11, and the Thomas Vicary Lecture on "The medieval conception of the anatomy and physiology of the central nervous system" will be delivered by Professor William Wright on November 18, at the college.

A PUBLIC inaugural lecture on "Science and culture" was delivered on November 6, at King's College, London, by Professor Julian S. Huxley, who was recently appointed to the chair of zoology in the college, in succession to the late Professor A. Dendy.

SIR HORACE CURZON PLUNKETT, F.R.S., formerly vice-president of the Department of Agriculture and Technical Instruction for Ireland, celebrated his seventy-first birthday on October 24.

J. S. GAMBLE, F.R.S., lately conservator of forests in India and director of the Imperial Forest School, Dehra Dun, died on October 16, aged seventy-eight years.

J. SAMOILOFF, professor of mineralogy at the Academy of Agriculture, Moscow, died suddenly on September 29 in his fifty-fifth year. A correspondent writes that Professor Samoiloff was a devoted student of the problems of the sedimentary rocks, on which he and his students in spite of difficult conditions have been carrying on active investigations during recent years. His special interest was in the contribution of organisms to both the rarer and the more common chemical constituents of these rocks, an interest which doubtless resulted from his extensive work on the great phosphate deposits of Russia. His unforeseen death is particularly unfortunate at this time, as the International Geologic Congress, which meets next year in Spain, is compiling a report on phosphate deposits, on which he was probably the greatest living authority.

THE forty-third annual meeting of the American Society of Naturalists will be held in New Haven, Conn., from December 28 to 30, in conjunction with the meetings of the American Society of Zoologists, the Geological Society of America, the Paleontological Society and the Mineralogical Society of America, under the auspices of Yale University and on the occasion of the dedication of the Peabody Museum. Plans are nearly completed for a symposium on "The structure of protoplasm" to be held, forenoon and afternoon, on December 30. Owing to the fact that the joint genetics sections of the American Society of Zoologists and the Botanical Society of America will hold their official program in Kansas City, the American Society of Naturalists has arranged to take charge of a program given jointly by the society and the joint genetics sections in New Haven. Members of this society are therefore invited to contribute papers on genetics. Papers should not occupy more than 15 minutes in presentation. Headquarters of the society will be at the Hotel Taft.

THE joint genetics program, to be given at both Kansas City and New Haven, will be open to all members of the Botanical Society of America and the American Society of Zoologists and others by introduction. The program at New Haven will be given jointly with the American Society of Naturalists and will be open to members of that society. The official meeting of the genetics sections will be held at Kansas City in conjunction with the meeting of the Botanical Society. The program at Kansas City as tentatively arranged will be given on December 29, 30 and 31, and at New Haven on December 28, 29 and 30. Titles to be placed on the printed programs for either place should reach the secretary of the genetics sections, D. F. Jones, of the Connecticut Agricultural Experiment Station, by November 20.

UNIVERSITY AND EDUCATIONAL NOTES

AT the University of Chicago, Professor A. A. Michelson, head of the department of physics since the founding of the university; Dr. Ludwig Hektoen, head of the department of pathology since 1901, and Dean Albion W. Small, head of the department of sociology and anthropology since 1892, are resigning as executive heads of their departments. Their places will be taken by Professor Henry G. Gale, Professor H. Gideon Wells and Professor Ellsworth Faris.

STANFORD UNIVERSITY opened the year with a number of new department heads. The vacancy at the head of the department of zoology made by the retirement of Dr. Gilbert is filled by Professor John O. Snyder, '97, who has been connected with the teaching force of the department since his graduation. Dr. George J. Peirce, professor of botany and plant physiology, becomes head of the department of botany to succeed Dr. Campbell, who retired at the end of last year.

DR. ALDO CASTELLANI, now professor in the London School of Tropical Medicine, has accepted an appointment as head of the department of tropical medicine at Tulane University of Louisiana School of Medicine, New Orleans, and will arrive in that city in December. According to the *Journal* of the American Medical Association, the reorganized department of tropical medicine will have three assistant professors and a staff of technicians and will provide training for undergraduate and graduate students; it will conduct research on the dietary problems of tropical climes, on disturbances arising from fungi, on the parasitic diseases and on the results of exposure to tropical sunlight.

DR. HOLMES C. JACKSON, professor of physiology in the New York University and Bellevue Medical College, has been named dean of the New York College of Dentistry.

DR. H. M. PARSHLEY, of Smith College, has been promoted from associate professorship to be professor of zoology.

EDWIN KURTZ, assistant professor of electrical engineering at the Iowa State College, Ames, has been appointed head of the department of electrical engineering of the Oklahoma Agricultural and Mechanical College, Oklahoma.

W. T. DAWSON, acting professor of physiology and director of laboratory of pharmacology, Woman's Medical College of Pennsylvania, has been appointed associate professor of physiology in the Medical Department of the University of Texas.

J. A. CARROLL, assistant director of the Solar Physics Observatory at the University of Cambridge, has been appointed university lecturer in astrophysics for five years.

DISCUSSION AND CORRESPONDENCE

THE FLORIDA MAN

IN SCIENCE of September 18, Dr. W. H. Holmes, under the title of "The antiquity phantom in American archeology," devotes two pages to caustic criticism of my report of finding human artifacts associated with the bones of mammoth in Florida. Had Dr. Holmes been considerate enough to give me some idea of his intention in this matter, I do not think he would have published such a paper; for he would have known that Amherst College, in conjunction with the Bureau of Ethnology of the Smithsonian Institution, sent a joint expedition this last summer to the Florida field to get more data on this controverted question; and that in four widely separate stations, one at Vero and three near Melbourne, either human bones or artifacts were found, always in association with the bones of mammoth and mastodon, and in such a manner as to make it sure that man and these elephants lived at the same time. Had Dr. Holmes examined either the artifacts or the deposits at Melbourne or Vero, he could hardly lecture on burial mounds, uprooted trees or quarrying for flints in the mucks and sands of Florida.

That Florida has oscillarted in level, and that such rivers as the St. Johns and Indian and their tributaries with their channels below sea level are drowned rivers should be clear to one with Dr. Holmes's geological experience; and the time when this downward movement took place will be determined by the content of the fills, that is, by the bones of mammoth, horse, tapir, etc., found in the sand and muck which fill these older channels. Geologists are not "slow to recognize the fact that human relics belonging on or near the surface are liable to intrusion," but having studied these stream deposits, must decide whether they have been disturbed. Had Dr. Holmes ever examined these beds, showing uniformly two corresponding horizons, each with its peculiar fauna, and recurring in at least five different stream channels, separated in the extreme by forty miles, he would surely look for some other explanation than accidents.

As to the Pleistocene age of the human bones, our results of last summer, soon to be published, show that they do not belong to the older horizon, but to the upper bed; and that whatever the age of the elephants, the age of the man is the same. Dr. Holmes asks geologists to reserve their final determinations until beyond the danger of error. The only way this question can be settled is to report all first hand data, and it is from the facts gathered on the spot that it must be settled. As to Indians finding fossil bones uncovered by the streams and utilizing them for making implements, this is absurd, as any one who has collected these bones knows how soft they are when uncovered and how punk-like they remain, even when dry. I would like also to state that the collecting done by Dr. Sellards at Vero was carefully done and minutely recorded and is not to be disregarded without proper field study. Finally, such a question as this will only be settled by cooperation between geologists and archeologists.

F. B. LOOMIS
AMHERST COLLEGE

EVIDENCE ON BASIN RANGE STRUCTURE

THE origin and structure of the Basin Ranges has been actively discussed ever since King and Gilbert gave publicity to their different views on this problem. The discussion has been continued recently by several geologists. Keyes[1] vigorously opposes the fault-block hypothesis, stating that a normal fault has not as yet been revealed in any piedmont belt. Ransome[2] cites the normal fault at Jerome, Arizona, which forms the eastern front of a mountain mass locally known as the Black Hills, as a clearly demonstrable example of the type of structure believed to be characteristic of the Basin Ranges. But the Jerome fault is located near the southeastern boundary of the Great Basin province, and the Black Hills might not be considered as a typical Basin Range by some geologists. In a recent paper Davis[3] has summarized the evidence in favor of block faulting as an explanation of Basin Range structure.

In all discussions of the Basin Range problem seen by me there has been no reference to the faulting that occurred along the western base of the Sonoma Range in central Nevada at the time of the Pleasant Valley earthquake of October 2, 1915. This earthquake was investigated, at the time, by Professor J. Claude Jones, who published a very interesting account of

[1] Keyes, Charles, "Geology of Nevada," *Pan. Amer. Geol.*, vol. 40, p. 36, 1923.

[2] Ransome, F. L., "Basin range structure at Jerome, Arizona," SCIENCE, vol. 61, pp. 659–660, 1925.

[3] Davis, W. M., "The basin range problem," Proc. Nat. Acad. Sci., vol. 11, pp. 387–392, 1925.

it.[4] The southern half of an old fault was ruptured for a distance of over twenty miles and a fault scarp formed that in places had a height of ten to fifteen feet. Where the rock surface was exposed the fault plane had a dip of 54° due west.

The effect of this displacement was to increase the elevation of the mountain range relative to Pleasant Valley. Another and older fault scarp, six to ten feet in height, which can be traced along the base of the range several miles north of the scarp of 1915, is described by Jones as "comparatively recent."

It is now known that large faults are the result of repeated small displacements, such as the one that occurred in Pleasant Valley. Students of structural geology have not given sufficient attention to the movements of the earth's crust that are going on at the present time. In tectonics no less than in sedimentation "the present is the key to the past." In this connection it is encouraging to note that the National Research Council has recently appointed a committee on the testing of isostasy in the Basin Ranges.

STEPHEN TABER

UNIVERSITY OF SOUTH CAROLINA

DIPLOID MALES FROM FERTILIZED EGGS IN HYMENOPTERA

THE question of sex determination and parthenogenesis in Hymenoptera has been the subject of much interest and debate among bee breeders and biologists. According to Dzierzon (1845) the drones of the honey-bee are developed from unfertilized eggs, queens and workers from fertilized. Recent cytological work has shown that in the germ tract at least females are diploid, males haploid. Experiments with the parasitic wasp, Habrobracon, have shown orange eye color to be inherited in sex-linkoid fashion so that males inherit from their mother alone, females from both sexes. A few patroclinous mosaic males with black eyes arose from certain crosses, orange-eyed females by black-eyed males, from which only orange males were to be expected. These exceptional black males mated to orange females produced orange daughters and in a single case an orange brother of patroclinous males produced only black daughters. It was therefore postulated that fertilization was incomplete, and that cleavage of male and female pronuclei had taken place without fusion. These mosaic males were of normal fertility.

[4] Jones, J. Claude, "The Pleasant Valley, Nevada, earthquake of October 2, 1915," *Bull. Seis. Soc. Amer.*, Vol. 5, pp. 190–205, 1915.

At the same time there were produced from similar crosses black-eyed patroclinous males that were completely or almost completely sterile. Their few daughters were black-eyed, completely sterile and often morphologically abnormal. The mosaic theory was naturally extended to include these anomalous males. Their sterility and that of their daughters remained unexplained.

With the occurrence of further mutations it has been possible to show that these males are in all probability not haploid mosaics but are diploid, inheriting from both parents factors modifying the same structure. Thus two recessive wing mutations reconstitute the normal wing in the black-eyed males as in their sisters, while their orange-eyed brothers possess the maternal wing character.

The questions as to cause of sterility in these patroclinous males and their few daughters, as to why these males transmit only black and finally why they are males at all are still unanswered. Experiments now in progress may solve some of these questions. Results will be published in full later.

P. W. WHITING
ANNA R. WHITING

UNIVERSITY OF MAINE

A CONSERVATIONIST'S CREED AS TO WILD-LIFE ADMINISTRATION

(1) I BELIEVE that the fullest use should be made of our country's wild life resources from the standpoint of human benefit—for beauty, education, scientific study, recreation, for sport, for food, for fur, etc. *All* these possible uses should be considered in the administration of wild life, not any one of them exclusively of the others. At the same time, any one use may be of more importance than the others in a given locality, so that such locality may be administered with that particular value most prominently in view.

(2) I believe that that portion of our wild animal life known as "game" belongs no more to the sportsman than to other classes of people who do not pursue it with shotgun and rifle. More and more the notebook, the field glass and the camera are being employed in the pursuit of game as well as other animals. The newer generation by hundreds of thousands is turning to nature-out-of-doors, for recreation, instruction and pleasure through such agencies as the national parks, summer camps, Boy Scouts, Girl Scouts and Camp Fire Girls. Indeed, these other claimants upon our "game" resources are probably reaching to numbers greater than those of active sportsmen; *their* rights certainly deserve at least equal consideration.

(3) I believe it is unwise to attempt the absolute extermination of any native vertebrate species whatsoever. At the same time, it *is* perfectly proper to reduce or destroy any species in a given neighborhood where sound investigation shows it to be positively hurtful to the majority of interests. For example, coyotes, many rodents, jays, crows, magpies, house wrens, the screech owl and certain hawks may best be put under the ban locally.

(4) I believe it is wrong to permit the general public to shoot crows or any other presumably injurious animals during the breeding season of our desirable species. It is dangerous to invite broadcast shooting of any so-called vermin during the regular closed season, when the successful reproduction of our valuable species is of primary importance and is easily interfered with.

(5) I believe in the collecting of specimens of birds and vertebrates generally for educational and scientific purposes. The collector has no less right to kill non-game birds and mammals, in such places where he can do so consistently with other interests, than the sportsman has right to kill "game" species. A bird killed, but preserved as a study-specimen, is of service far longer than the bird that is shot just for sport or for food.

(6) I believe that it is wrong and even dangerous to introduce (that is, turn loose in the wild) alien species of either game or non-game birds and mammals. There is sound reason for believing that such introduction, if "successful," jeopardizes the continued existence of the native species in our fauna, with which competition is bound to occur.

(7) I believe that the very best known way to "conserve" animal life, in the interests of sportsman, scientist and nature-lover, alike, is to preserve conditions as nearly as possible favorable to our own native species. This can be done by the establishment and maintenance of numerous wild-life refuges, not only as comprised in private and public parks, but in national forests and elsewhere.

(8) In the interests of game and wild life conservation generally, I believe in the wisdom of doing away with grazing by domestic stock, more especially sheep, on the greater part of our national forest territory. A further, and vital, interest bound up in this factor is the conservation of water.

(9) I believe that the administration of our game and wild life resources should be kept as far as possible out of politics. The appertaining problems are essentially biological ones and are fraught with many technical considerations not appreciated or understood by the average politician or sportsman. The resources in question should be handled as a national asset, administered with the advice of scientifically trained experts.

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A WHALE SHARK (RHINEODON) IN THE GULF OF SIAM

IN the early part of the year 1919, a huge shark became wedged in the entrance of a bamboo stake-trap set in water eight to nine fathoms deep off Koh Chik (= Chik Island), on the east side of the Gulf of Siam. The fish remained stuck for seven days, during which time all fishing had to be suspended. It was finally killed with rifle bullets and hauled out of the trap, but the combined efforts of the local fishermen were insufficient to drag it ashore.

The fishermen are quite familiar with sharks, which are caught almost daily in the bamboo traps set in the offshore waters of this section, but none of them had ever before seen or heard of a shark of this size or kind. From the descriptions of its shape, color, mouth and teeth given to me by eye-witnesses, I have no doubt the fish was a *Rhineodon*.

While no measurements of the shark were taken, its actual length was known by its position alongside the leader as it lay wedged in the narrow entrance of the trap. From several independent sources I have learned that the length of the monster was determined by the fishermen to be over 10 *wa*. The *wa* is the Siamese fathom, and originally represented the full stretch of a man's outspread arms; in recent years it has been stabilized and adopted by the royal survey department as the equivalent to two meters. Therefore, whether we regard the *wa* as being the somewhat elastic measure of the Siamese fishermen, with, say, 1.7 to 1.8 meters as an approximate average, or as being a full two meters, it would seem that in the fish in question we have rather more than the maximum length that has heretofore been ascribed to the whale shark.

HUGH M. SMITH

BANGKOK, SIAM,
JULY 8, 1925

SCIENTIFIC BOOKS

A Survey of Physics: A collection of lectures and essays by Max Planck. Translated by R. JONES and D. H. WILLIAMS. E. P. Dutton & Co., New York.

INSTEAD of writing a more or less formal review of this book it seems preferable to set forth its sub-

stance in a manner as simple and straightforward as possible so as to give the reader some help towards an understanding of the profound changes which modern researches have brought about in the fundamental ideas and theories of physics; and, of course, in a brief discussion of this subject it is necessary to assume that the reader has considerable knowledge of classical physics and that he knows something of the principle of relativity and a little of the quantum hypothesis.

The first really effective method to be employed in the physics was the method of mechanics. This method was founded by Galileo and Newton, and, as the method was developed and more and more successfully applied, it came more and more to dominate the philosophy of physics, until, about the middle of the nineteenth century, the "mechanical conception," as Planck briefly calls it, was generally believed to be an adequate basis for the analysis of all the phenomena of nature; the "mechanical conception" aimed to explain everything in terms of motion; the "mechanical conception" is the view that all phenomena can be reduced to movements of particles or elements of mass.

The discovery of the principle of the conservation of energy (which was at first thought to be a purely mechanical principle) tended to strengthen the "mechanical conception" and the development of the kinetic theory of gases was looked upon as a sample of the unlimited conquests which the "mechanical conception" was destined to make. The latter part of the nineteenth century was the Golden Age of the "mechanical conception."

An interesting consequence of the complete dominance of the "mechanical conception" in the philosophy of physics during the latter part of the nineteenth century was a reaction against the widespread acceptance as ultimate realities of such mechanical pictures as that afforded by the kinetic theory of gases, and this reaction was most effectively voiced by Ernst Mach. There was no definite experimental knowledge of the atom fifty years ago; the atom was only an idea at that time, and the proud philosophy of the "mechanical conceptionists" drove many physicists back to a notion of reality as old as Greek philosophy; and some philosophers like Ernst Mach placed what seems to us now too great an emphasis on this old point of view, namely, the point of view that nothing is real but our sense perceptions and that all science and all philosophy is an economic adaptation of our ideas to our perceptions, an adaptation growing out of our struggle for existence. This economic point of view can hardly explain a Newton or a Faraday, and Planck points out that it seems to be incompatible with the most important characteristic of the sciences, namely, the progressive attainment of a more and more general and unified point of view, which, while being kept in accord with experiment, becomes more and more nearly independent of the individuality of separate intellects, more and more nearly free from purely human bias, more and more nearly non-anthropomorphic.

Nevertheless the "mechanical conception" was a strong philosophy and under its stimulus important scientific work was done and some results of permanent value obtained. Planck mentions the kinetic theory of gases as one of these valuable results. Indeed the kinetic theory of gases is of very great value, although it is based on postulates which ascribe purely mechanical properties to the atom, whereas we have now renounced the purely mechanical conception of the atom.

The method of mechanics may be said to be still retained in modern physics and to be applicable to everything in nature where irreversible processes do not exist or where irreversible processes are neglected, and the method of mechanics thus widely used can be defined as including everything that conforms to and falls under the principle of least action; but the method of mechanics so defined, which Planck calls the method of dynamics, is by no means the same thing as the "mechanical conception" because in many cases it is independent of any knowledge of or any postulate concerning things or substances or particles which move. In particular it includes in its realm such things as electromagnetic disturbances (light) without requiring the existence of the ether, and it is entirely in accord with the principle of relativity.

It is apparently absurd to speak of a method as a mechanical method or as dynamics (after Planck) when there is no thought of motion of concrete things but at best only motion of energy (as in the case of light); but the method, in its mathematical aspects, in the kind of correlation which it accomplishes and in the kinds of measurements involved in its experimental researches, is the same old method of mechanics.

The reader will be left, as it were, in a mental vacuum by the above reference to the principle of least action as the thing which characterizes the method of mechanics, and it needs to be pointed out that the most advanced students of mathematical physics are but little better off than the reader in this respect, for no one as yet has any intuitive appreciation of the principle of least action nor any concep-

tual insight into its meaning. The mathematical physicist only knows how to formulate the principle mathematically and how to derive its consequences. The principle of least action applies to all mechanical phenomena, to all electromagnetic phenomena (including light) and to all thermal and chemical phenomena; but it fails in all these fields when there is any irreversible action. Because of this failure of the principle it is better to say that it is useful in correlating mechanical, electromagnetic, thermal and chemical effects when the accompanying irreversible action is negligible. All these effects are highly idealized when irreversible action is ignored because every phenomena in nature is accompanied by some irreversible action, and, of course, irreversible action is very much in evidence in many thermal and chemical phenomena.

Another method in physics, the method of thermodynamics, overlaps the method of mechanics, but goes beyond the method of mechanics inasmuch as it recognizes the existence of irreversible or sweeping processes in nature; but the method of thermodynamics has nothing to do with irreversible or sweeping processes themselves, but only with their results, and indeed with only one result, namely, the increase of entropy.

Another method in physics is the atomic method, or atomics, as it is often called. It is certainly true that atoms themselves are now the objects of observation and measurement in the laboratory, but only when the fourth method, the statistical method, as described below, is used. The great theoretical structure which is called the atomic theory, especially that branch of it which is called statistical mechanics (Gibbs) of which the kinetic theory of gases is a special case, is based even now on postulates; for no one could maintain that our real knowledge of atoms is of the kind that could be used as a foundation for any elaborate mathematical structure. The atomic method is the building up of elaborate pictures or conceptions of physical conditions and things, and its chief function is to make physical conditions and things intelligible or thinkable. The kinetic theory of gases, as it exists in the mind of a physicist, is pretty nearly a working model of a gas, and it enables the physicist to "see" the properties of a gas as effectively or even more effectively than he could see them in an actual working model.

A fourth method in physics is the statistical method. The best examples of the use of this method in the laboratory are, perhaps, Perrin's experimental studies of the Brownian motion and Rutherford's experimental studies of the scattering of alpha and beta rays. The statistical method as used in the kinetic theory of gases and in statistical mechanics is a purely theoretical structure and it belongs to the atomic theory, whereas by "the" statistical method we mean the laboratory study of actual erratic things and the interpretation of the observed results by the use of the theory of probability.

The characterization of physics in terms of methods seems to be more significant than the older subdivision of physics into branches according to subject-matter. Thus mechanics, hydrostatics, hydraulics, heat, optics, acoustics, electricity and magnetism are the old branches of physics, and the boundaries between these branches are rapidly disappearing with the advancement of physics, in fact, chemistry can no longer be thought of as a distinct branch of physical science. The branches of physical science grow less and less distinct as physical science develops, but the methods as above enumerated and briefly described are being more and more clearly recognized as distinct methods; and, what is even more important, every one of these methods has been more and more strengthened (in the field to which the method is really applicable) by modern discoveries. Thus Maxwell's theory has very greatly strengthened the dynamic method in the study of light although the electromagnetic theory of light is not a mechanical or dynamic theory in the older narrow meaning of these terms, and the altered points of view which have come from the principle of relativity have strengthened the method of dynamics.

Profound changes in our so-called fundamental ideas in physics have come about in recent years because of two things, namely, (a) an increasingly clear appreciation of the significance of irreversible actions in nature has led us to recognize definite limitations to the method of mechanics (Planck's dynamics), for an irreversible process is beyond the range of the mechanical method, and (b) the principle of relativity has modified our ideas of time and space and has extended the idea of energy to include the idea of mass; but these changes in our so-called fundamental ideas seem to be merely formal or at most these changes seem to have eliminated only what is non-essential from our fundamental ideas, leaving our methods essentially unaltered; but the quantum hypothesis seems to strike more deeply.

The quantum hypothesis denies the principle of continuity as used throughout the method of mechanics. Atomic processes take place by jumps so that the idea of time as a continuous flux is brought into question, and if time as a continuous flux is objectively non-existent then the whole structure of theoretical dynamics must be purely idealistic and at best only applicable to large scale phenomena. Indeed, the atomic theory itself raises the presumption that continuous space is an idea, not a physical fact, as

was pointed out by Riemann many years ago, and thus the purely idealistic character of theoretical dynamics is again indicated.

The whole of statistical mechanics, which includes the kinetic theory of gases, is a theoretical structure based upon purely mechanical postulates concerning atomic action whereas the quantum hypothesis rules out the purely mechanical conceptions of atomic action and it seems therefore that the quantum hypothesis is likely to lead to profound changes in the atomic method.

As stated above the methods of physics have remained almost wholly unchanged by modern developments, and, although the principle of continuity is in danger of being thrown out by the quantum hypothesis, the other principles of physics seem to be altered by being made more general. (a) The principle of the conservation of energy still stands, but the principle of the conservation of man has become a part of it. (b) The principle of the conservation of momentum retains its validity in a decidedly widened field. (c) The second law of thermodynamics is untouched. Many men who hold a principle narrowly seem to feel that the principle is destroyed by a change which on careful scrutiny turns out to be only a generalization of the principle.

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SPECIAL ARTICLES

HIGH VOLTAGE CATHODE RAYS OUTSIDE THE GENERATING TUBE[1]

LENARD succeeded in getting electrons from a cathode-ray tube out through a thin metal window into the air. The voltage employed was that necessary to produce a 3 cm. spark between small spheres. The window consisted of a piece of aluminum foil 0.00265 mm. thick and 1.7 mm. in diameter.

With a specially designed hot cathode, high vacuum tube, it has been found possible to operate with as much as 200,000 volts and several milliamperes, using a window as large as 8 cm. in diameter. The general design of this tube would seem to permit of the use of still larger windows and higher currents.

The maximum range of the electrons in the air in front of the window has been measured approximately by the luminescence of lime. It is a linear function of the voltage applied to the tube and for an aluminum window 0.0254 mm. thick, is given by the equation:

$$\text{Range (cm.)} = 0.254 \times \text{Kilovolts (max.)} - 17.8.$$

The lowest peak voltage at which there is appreciable intensity in front of and close to the window is 70 kilovolts, and the maximum range at the highest voltage used, 250 kilovolts, is 46 cm.

The luminosity of the air in the path of the discharge is very beautiful, especially at the higher voltages, where, due to scattering, the beam is seen to spread out and bend around until it finally extends more than half as far back of the window as it does in front of it. The appearance is then that of a solid ball of purple glow with its center a little front of the window.

Calcite crystals, upon being rayed, fluoresce strongly in the orange and remain highly luminous for several hours after raying. In addition to this they may show bright bluish white scintillations. These have been observed while the crystal is undergoing bombardment and for as long as a minute after raying. By slightly scratching the rayed surface of the crystal with any sharp instrument, the scintillations may be produced for as long as an hour after raying.

The area in the neighborhood of a scintillation loses all of its luminosity as the scintillation takes place and then appears dark against the bright orange background.

Under the microscope the spot where the scintillation took place is marked by a little crater with many tiny canals leading into it.

The high voltage electrons from this tube when brought into gases cause various reactions somewhat as Lind finds for radium emanation. The quantity relations are such that large amounts of the resulting substances may be made. For example, with such a tube there has been produced from acetylene relatively large quantities (grams) of a yellow compound which resembles the product previously obtained in small quantities both from the corona discharge in acetylene and from the use of radium emanation.

Many liquids and solids also undergo marked chemical changes under the influence of the high speed electrons. For example, castor oil changes rapidly to a solid material. Crystals of cane sugar turn white in color and, upon subsequent gentle heating, evolve considerable quantities of gas. An aqueous solution of cane sugar becomes acid to litmus upon being rayed.

The effect on organized tissues is very pronounced, as may be seen from the following examples.

When a portion of the leaf of the rubber plant (*Ficus Elastica*) is rayed with 1 milliampere for as long as 20 seconds, the rayed area becomes immediately covered with white latex, as though the cell walls had, in some way, been ruptured. An exposure of as little as 0.1 milliampere for 1 second produces a visible color change with subsequent drying out of the

[1] Preliminary communication.

rayed area to a depth corresponding to the penetration of the rays.

The ear of a rabbit was rayed over a circular area 1 cm. in diameter with 0.1 milliampere of current for 0.1 second. Within a few days the rayed skin became deeply pigmented and the hair came out. It was not until seven weeks after the treatment that new hair appeared.

A second similar area was rayed with 1 milliampere of current for 1 second. After several days a scab formed over the rayed area and a few days later the scab came off taking the hair with it. Two weeks later a profuse growth of snow white hair started and soon became much longer than the original gray (drab colored) hair.

A third area on the ear was rayed with 1 milliampere for 50 seconds. In this case a scab developed on both sides of the ear and these scabs later fell out leaving a hole in the ear. The periphery of this hole was at first devoid of hair but is now covered with a growth of snow white hair.

Fruit flies, upon being rayed for a small fraction of a second with 1 milliampere, instantly showed almost complete collapse and in a few hours were dead.

Bacteria have been rayed and an exposure of 1/10 second has been found sufficient to kill even the highly resistant spores of *b. subtilis*.

The phenomena of luminescence, phosphorescence, thermo-luminescence and change of color which take place as a result of electron bombardment from the tube are very striking and easily demonstrated, and many substances which could not be brought into a vacuum can be subjected to electron bombardment in this way.

Detailed reports of this work are now being prepared for publication.

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THE TRANSFER OF TOBACCO AND TOMATO MOSAIC DISEASE BY THE PSEUDOCOCCUS CITRI[1]

AMONG several thousand tobacco and tomato seedlings in the greenhouse during a year and a half, in no instance was there observed spontaneous mosaic disease. Almost all these plants were repotted during this period, many were cut back and over two hundred were injured and injected with non-mosaic materials. These observations support the opinion of Allard and others that mosaic disease in these species does not arise spontaneously in healthy growths. They are not, however, in agreement with the belief of Woods and of Heintzel that the active agent is an enzyme present in all healthy tobacco plants, or of Hunger and of Sturgis, among others, that mosaic is a physiological disease which arises as a result of unfavorable conditions. In addition, three hundred plants, grown from seeds obtained from a tobacco growth that had had this affection for at least six months, remained healthy; thus we have demonstrated, as others have done previously (Allard, Gardner and Kendrick), that the disease is not seed-borne.

Recently—in June, 1925—an infestation occurred in the greenhouse with the *Pseudococcus citri* (family *Coccidae*; sub-family *Dactylopinae*). These "mealy" bugs were found not only on the normal, but also on the mosaic plants, all having been kept under the same roof. About one month after the insects appeared, twenty of fifty tobacco plants, uninoculated or uninjured, but infested with the bugs, showed typical mosaic disease. Twenty-four normal tomato plants, similarly infested, were removed from the greenhouse and replanted in a field. After a month all developed into typical mosaic growths. On the other hand, thirty-six tomato plants free from *Pseudococcus citri* remained normal after transfer to the field. Insecticides were applied and the greenhouse was freed from these insects. At least five hundred tobacco and tomato plants, forty of which were injured by thoroughly scratching two leaves of each, were subsequently grown there. All these remained healthy. Finally, the pseudococci were removed from mosaic tissues on which they had been feeding and three to five were gently transferred to each of nine tomato and five tobacco plants. Of the former, seven, and of the latter, three exhibited typical mosaic disease after incubation periods of from ten to twenty-one days.[2]

It appears, therefore, that the *Pseudococcus citri* is a vector of the mosaic virus.

To summarize, it may be stated that spontaneous mosaic does not occur in healthy or injured tobacco or tomato, or in these plants injected with non-mosaic materials; nor is the disease seed-borne. If the affection occurs under these conditions, care should be taken to eliminate as a factor the *Pseudococcus citri*, which is a carrier of the mosaic virus in greenhouses, in the same way as are the *Aphididae* in the field.

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[1] I am indebted to Mr. Peter P. Haselbauer for his technical assistance and for his hearty cooperation.

[2] The incubation period, after injection of mosaic virus, is generally about ten days. Concentration of the virus, however, to one tenth of its original volume shortens this period to five days.

MEETING OF THE EXECUTIVE COMMITTEE OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE regular fall meeting of the executive committee of the association was held at the Cosmos Club in Washington, on October 25, in three sessions. The following paragraphs summarize the business transacted. *The forenoon session* convened at 10:10, with the committee chairman, Dr. J. McK. Cattell, in the chair. The following members were present: Cattell, Fairchild, Humphreys, Kellogg, Livingston, Moulton, Noyes, Pupin, Ward. Absentees were Duggar and Wilson. By invitation Dr. Rodney H. True, secretary of the committee of one hundred on scientific research, was in attendance.

1. The permanent secretary's annual report on the affairs of the association was presented and accepted. It will be published in SCIENCE.

2. It was reported that the permanent secretary's office is arranging to have one or more representatives of the association in each state, to make prompt reports on legislative and other occurrences and activities that may tend to advance or retard the progress of science and education. It is planned that reports, as they come in, are to be digested and published in SCIENCE, for the information of members and others interested in the advancement of knowledge. The divisions of the association and the affiliated academies have aided in selecting the representatives for their respective states. The executive committee requested the permanent secretary to ask these representatives to report from time to time important movements or actions that are favorable to the progress of science and education as well as unfavorable ones.

3. A plan was approved by which persons in arrears for membership dues may at any time become life members by paying the life-membership fee ($100), without also paying up their arrearage. Each such member is to be reinstated and his life membership is to date from the receipt of the fee.

4. It was voted that new members who join the association during the current year may omit the payment of the regular five-dollar entrance fee if they become life members, paying the regular life-membership fee. New members may be credited with payment of $10 towards the life-membership fee if they pay the entrance fee and the first annual dues on joining and if they pay the remaining ninety dollars at any subsequent time during the year. Any member in good standing may become a life member at any time by paying ninety-five dollars, the annual dues already paid for the current year being credited to his account as regards life membership.

5. The committee approved a general campaign for an increased number of life members. (Forty-one new life members were enrolled in the fiscal year ended September 30 last.)

6. The executive committee recommended to the council the following appropriations for the current fiscal year, from the available funds in the treasury. This recommendation will be brought before the council at the Kansas City meeting.

a. To the American Association Table at the Naples Zoological Station	$500
b. To the International Annual Tables of Physical, Chemical, and Technological Data	$200
c. To the American Institute of Sacred Literature	$60
d. To individual grants for research, to be allotted by the Committee on Grants	$3,000

7. The executive committee appropriated the sum of $500 from the available funds of the treasury, to care for the expenses of the Committee of One Hundred on Scientific Research for the current year.

8. It was voted that Dr. Henry B. Ward be requested to visit Kansas City and be given charge of certain features of the preparations for the Kansas City meeting.

The afternoon session convened at 2:30, with Dr. Cattell in the chair and the following members present: Cattell, Fairchild, Kellogg, Livingston, Moulton, Noyes, Pupin, Ward. Dr. True was present by invitation.

9. It was voted that the association heartily approves suggestions presented by President Pupin, that steps be taken as far as possible to further cooperation between the engineering societies and the association. According to these suggestions, Dr. J. McK. Cattell (chairman of the executive committee of the association) and Dr. Ira N. Hollis (past vice-president for the engineering section) were named as representatives of the association to work toward this end with representatives of the four Founder Societies in engineering.

10. President Pupin explained a plan to have an evening session at the Kansas City meeting to emphasize the relations of engineering to the other science groups in the association, with the hope that Mr. Herbert Hoover, secretary of commerce, may accept an invitation to address the association on that evening. The committee heartily approved the suggestions made by President Pupin and extended to Mr. Hoover a very cordial invitation to attend the Kansas City meeting and deliver an evening address. The permanent secretary was instructed to transmit this invitation to Mr. Hoover.

11. The auditor of the association, Dr. Robert B. Sosman, was named as one of three members, any two of whom are authorized to have access to the safety-deposit drawer of the Association in the American Security & Trust Company in Washington. (The other two, already named, are the treasurer and the permanent secretary. It is required that two of these three members shall present themselves whenever access to the drawer is desired.)

12. The permanent secretary was authorized to complete the roll of the prize award committee for the Kansas City meeting.